

DVSM vs Streaming Video
Bandwidth Requirements

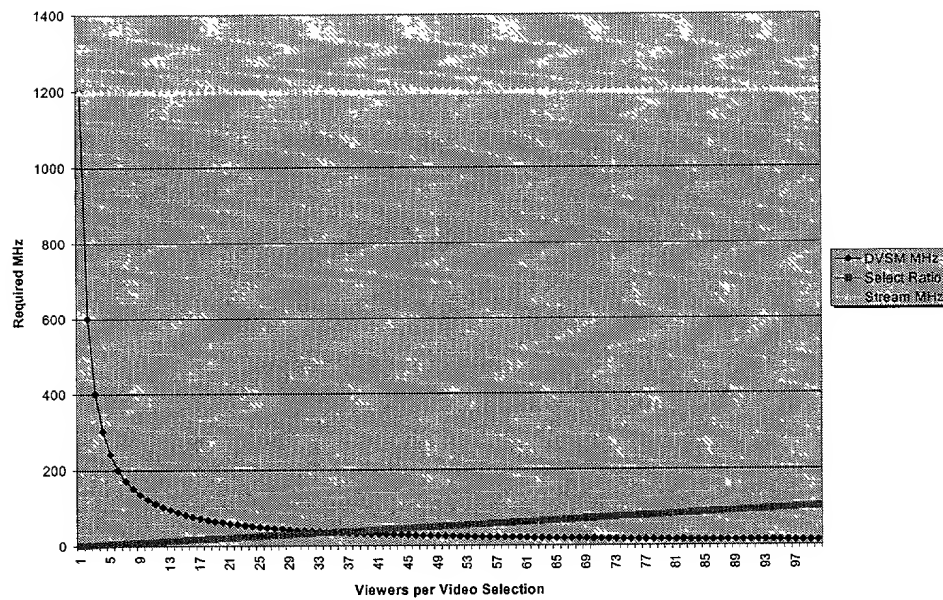


Figure 1 - Bandwidth Requirements

DVSM vs. Streaming Video Network Cost

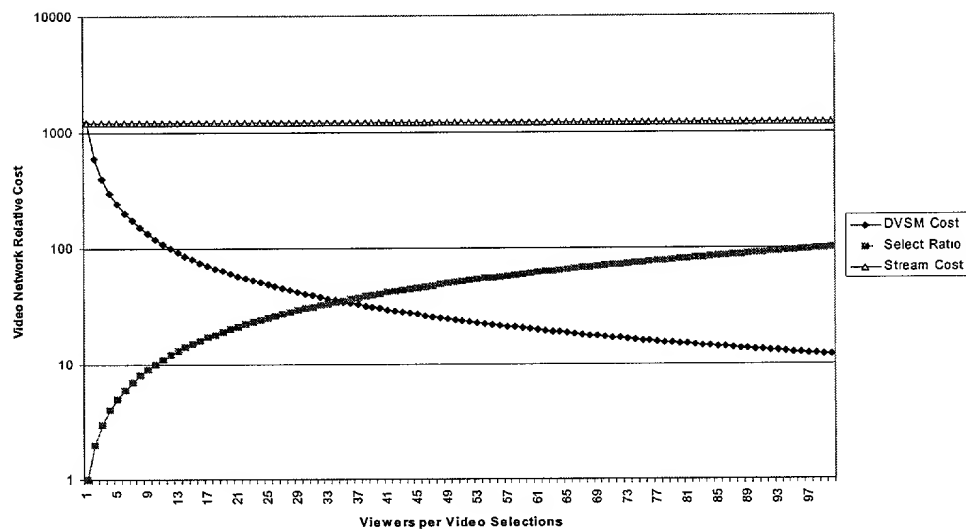


Figure 2 - Logarithmic Cost Relationship

Time	User ¹	User ²	User ³	User ⁴	User ⁵	User ⁶	User ⁷	User ⁸	User ⁹	User ¹⁰
T ¹	V ^{1s1}				V ^{2s1}		V ^{1s1}			V ^{3s1}
T ²	V ^{1s2}	V ^{1s1} √ ^{1s2}		V ^{2s1} √ ^{2s2}	V ^{2s2}		V ^{1s2}			V ^{3s2}
T ³	V ^{1s3}	V ^{1s3}		V ^{2s3}	V ^{2s3}		V ^{1s3}	V ^{3s1}		V ^{3s3}
T ⁴	V ^{1s4}	V ^{1s4}	V ^{1s1} √ ^{1s2} √ ^{1s3}	V ^{2s4}	V ^{2s4}		V ^{1s4}	V ^{3s2} √ ^{3s3}		V ^{3s4}
T ⁵	V ^{1s5}	V ^{1s5}	V ^{1s4} √ ^{1s5}	V ^{2s5}	V ^{2s5}		V ^{1s5}	V ^{3s4} √ ^{3s5}		V ^{3s5}
T ⁶	V ^{1s6}	V ^{1s6}	V ^{1s6}	V ^{2s6}	V ^{2s6}		V ^{1s6}	V ^{3s6}	V ^{3s1}	V ^{3s6}
T ⁷	V ^{1s7}	V ^{1s7}	V ^{1s7}	V ^{2s7}	V ^{2s7}		V ^{1s7}	V ^{3s7}	V ^{3s2} √ ^{3s3}	V ^{3s7}
T ⁸	V ^{1s8}	V ^{1s8}	V ^{1s8}	V ^{2s8}	V ^{2s8}		V ^{1s8}	V ^{3s8}	V ^{3s4} √ ^{3s5}	V ^{3s8}
T ⁹	V ^{1s9}	V ^{1s9}	V ^{1s9}	V ^{2s9}	V ^{2s9}	V ^{1s1} √ ^{1s2} √ ^{1s3}	V ^{1s9}	V ^{3s9}	V ^{3s6} √ ^{3s7}	V ^{3s9}
T ¹⁰	V ^{1s10}	V ^{1s10}	V ^{1s10}	V ^{2s10}	V ^{2s10}	V ^{1s4} √ ^{1s5}	V ^{1s10}	V ^{3s10}	V ^{3s8} √ ^{3s9}	V ^{3s10}
T ¹¹	V ^{1s11}	V ^{1s11}	V ^{1s11}	V ^{2s11}	V ^{2s11}	V ^{1s6} √ ^{1s7}	V ^{1s11}	V ^{3s11}	V ^{3s10} √ ^{3s11}	V ^{3s11}
T ¹²	V ^{1s12}	V ^{1s12}	V ^{1s12}	V ^{2s12}	V ^{2s12}	V ^{1s8} √ ^{1s9}	V ^{1s12}	V ^{3s12}	V ^{2s12}	V ^{3s12}
T ¹³	V ^{1s13}	V ^{1s13}	V ^{1s13}	V ^{2s13}	V ^{2s13}	V ^{1s10} √ ^{1s11}	V ^{1s13}	V ^{3s13}	V ^{2s13}	V ^{3s13}
T ¹⁴	V ^{1s14}	V ^{1s14}	V ^{1s14}	V ^{2s14}	V ^{2s14}	V ^{1s12} √ ^{1s13}	V ^{1s14}	V ^{3s14}	V ^{2s14}	V ^{3s14}
T ¹⁵	V ^{1s15}	V ^{1s15}	V ^{1s15}	V ^{2s15}	V ^{2s15}	V ^{1s14} √ ^{1s15}	V ^{1s15}	V ^{3s15}	V ^{2s15}	V ^{3s15}
T ¹⁶	V ^{1s16}	V ^{1s16}	V ^{1s16}	V ^{2s16}	V ^{2s16}	V ^{1s16}	V ^{1s16}	V ^{3s16}	V ^{2s16}	V ^{3s16}
T ¹⁷	V ^{1s17}	V ^{1s17}	V ^{1s17}	V ^{2s17}	V ^{2s17}	V ^{1s17}	V ^{1s17}	V ^{3s17}	V ^{2s17}	V ^{3s17}
T ¹⁸	V ^{1s18}	V ^{1s18}	V ^{1s18}	V ^{2s18}	V ^{2s18}	V ^{1s18}	V ^{1s18}	V ^{3s18}	V ^{2s18}	V ^{3s18}
T ¹⁹	V ^{1s19}	V ^{1s19}	V ^{1s19}	V ^{2s19}	V ^{2s19}	V ^{1s19}	V ^{1s19}	V ^{3s19}	V ^{2s19}	V ^{3s19}
T ²⁰	V ^{1s20}	V ^{1s20}	V ^{1s20}	V ^{2s20}	V ^{2s20}	V ^{1s20}	V ^{1s20}	V ^{3s20}	V ^{2s20}	V ^{3s20}

Figure 3 - Dynamic Multicasting

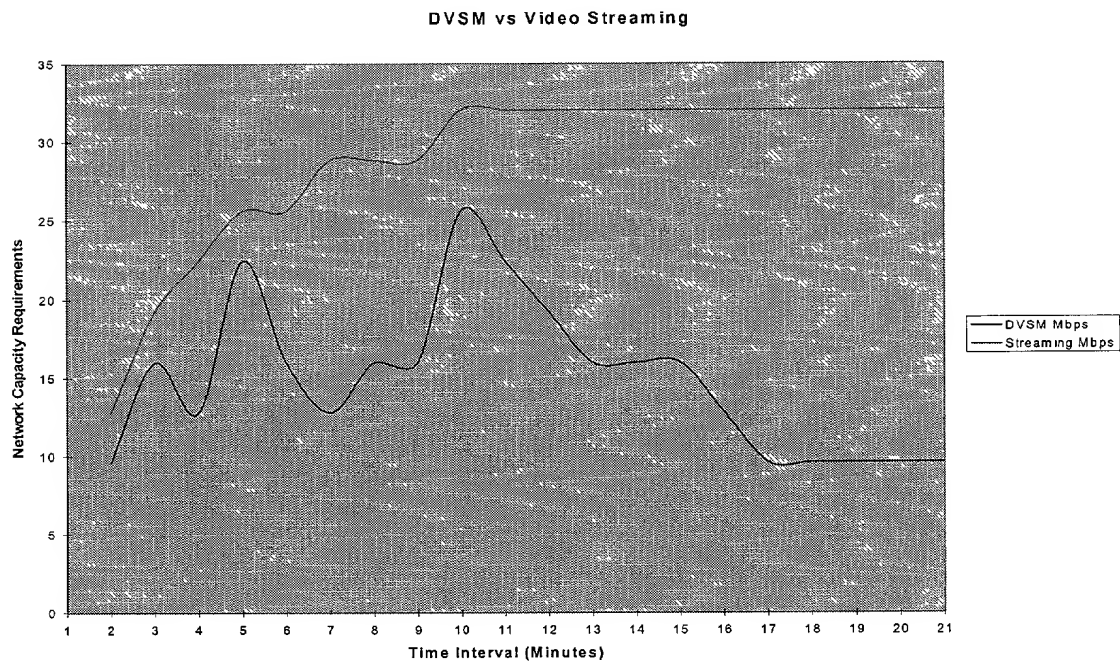
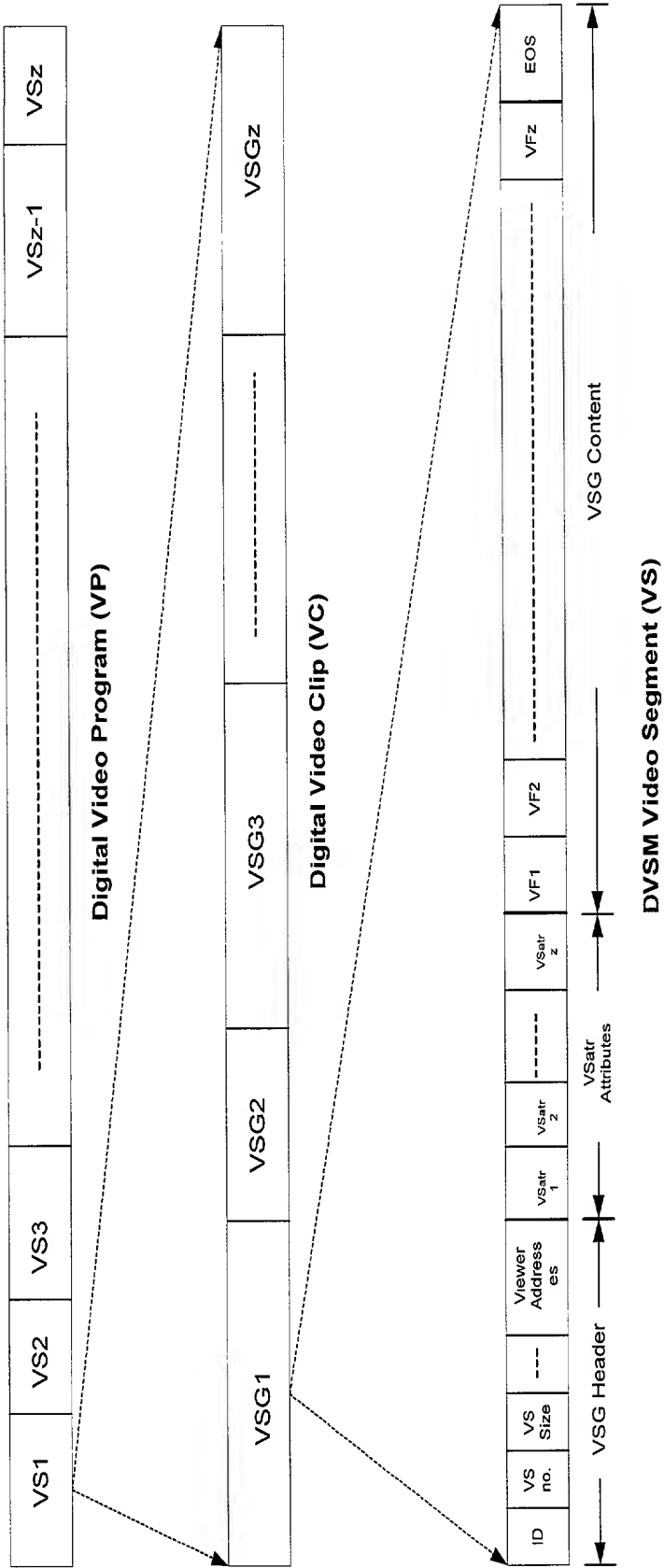


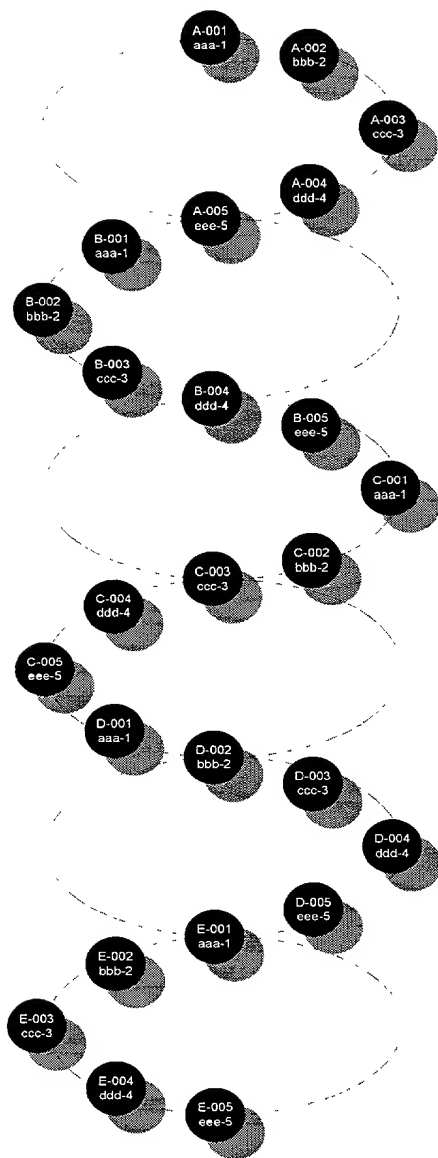
Figure 4 - Bandwidth Capacity Comparison **

** In Figure 4 the top line is video streaming and the bottom line is DVSM. The Delta between the video streaming line and the DVSM line is the bandwidth capacity saving achieved by using DVSM technology.



- VS -- Video Scene
- VSG -- Video Segment
- VF -- Video Frame
- VSatr -- Video Segment Attribute
- EOS - End Of Segment

Figure 5(a) - DVSM Format



Code	Flag	Tag	Mark	Function
"A"	001	aaa	User 1	X - Off
"A"	002	bbb	User 2	R - Off
"A"	003	ccc	User 3	PG 13 - Off
"A"	004	ddd	User 4	PG - Off
"A"	005	eee	User 5	NR - Off
"B"	001	aaa	User 1	if: a>x=1<y3.2
"B"	002	bbb	User 2	if: a>x=1<y3.2
"B"	003	ccc	User 3	if: a>x=1<y3.2
"B"	004	ddd	User 4	if: a>x=1<y3.2
"B"	005	eee	User 5	if: a>x=1<y3.2
"C"	001	aaa	User 1	x=01 y=01 link
"C"	002	bbb	User 2	x=01 y=01 link
"C"	004	ccc	User 3	x=01 y=01 link
"C"	004	ddd	User 4	x=01 y=01 link
"C"	005	eee	User 5	x=01 y=01 link
"D"	001	aaa	User 1	1, 2...(z-1).dvs
"D"	002	bbb	User 2	1, 2...(z-1).dvs
"D"	003	ccc	User 3	1, 2...(z-1).dvs
"D"	004	ddd	User 4	1, 2...(z-1).dvs
"D"	005	eee	User 5	1, 2...(z-1).dvs
"E"	001	aaa	User 1	link=\\www.*.*
"E"	002	bbb	User 2	link=\\www.*.*
"E"	003	ccc	User 3	link=\\www.*.*
"E"	004	ddd	User 4	link=\\www.*.*
"E"	005	eee	User 5	link=\\www.*.*

1. Flags, tags, marks and codes are the attributes used to provide the system the appropriate instructions that will allow for individualized "Microcasting" sessions
2. In this illustration codes are used to designate specific functions. For example, based on movie rating code "A" designates an "off" function. Normally the system operates on an exception basis, therefore only "off" authorizations are needed. "B" is the bit rate i.e., 1 0, 1 6 or 3 2 Mbps. "C" designates the actions to be taken regarding Icons located within the video segment. "D" are destination codes for advertising and "E" are the actions associated with interactive elements within the segment.
3. Each code will have its own set of flags, tags and marks i.e., individuals within the household can be identified by designated marks. Legends for these flags, tags and marks are easily created in a plurality of combinations.

Figure 5(b) - DVSM Attributes

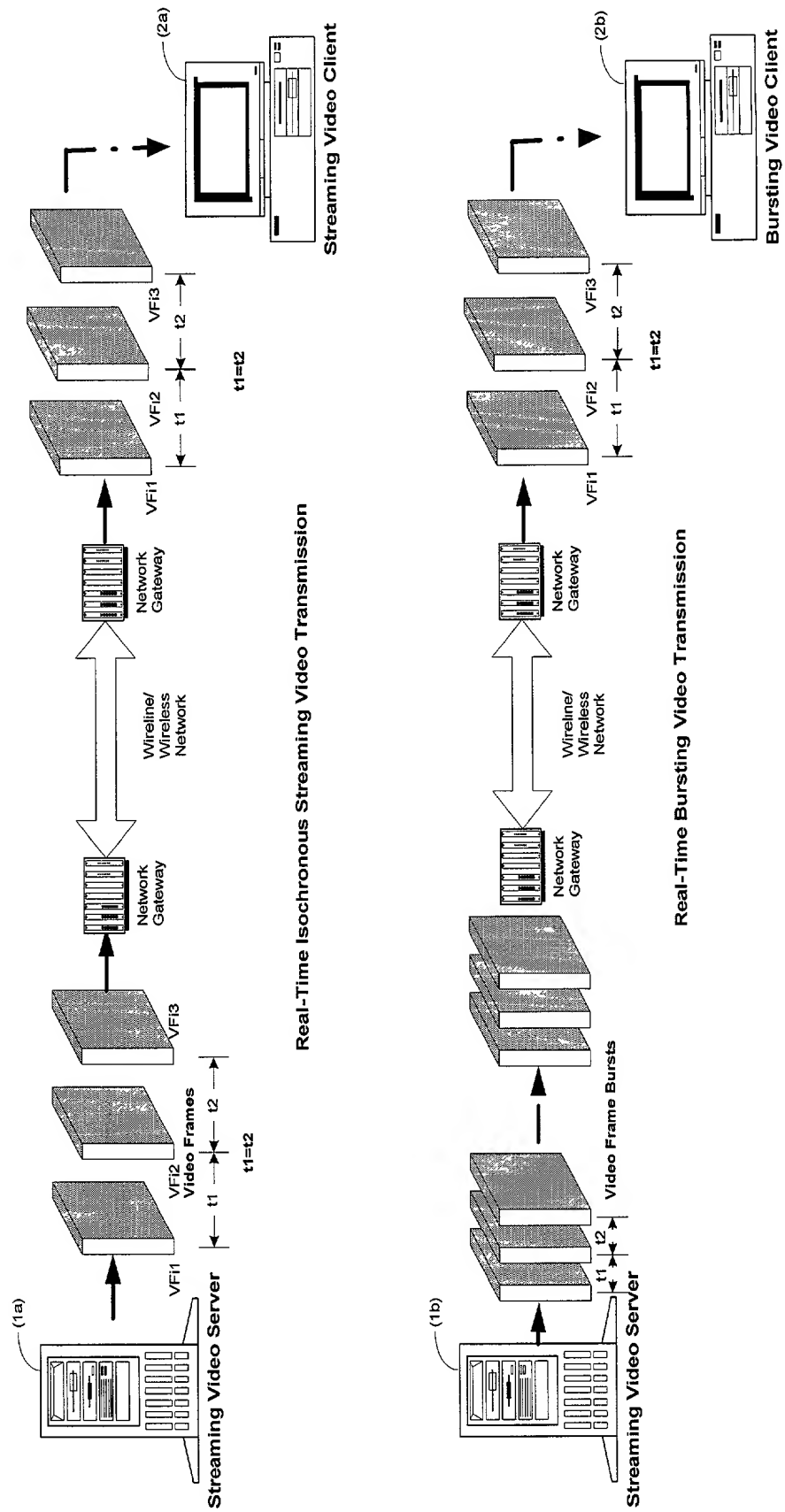


Figure 6(a) - Streaming & Bursting Video Frames Transmission

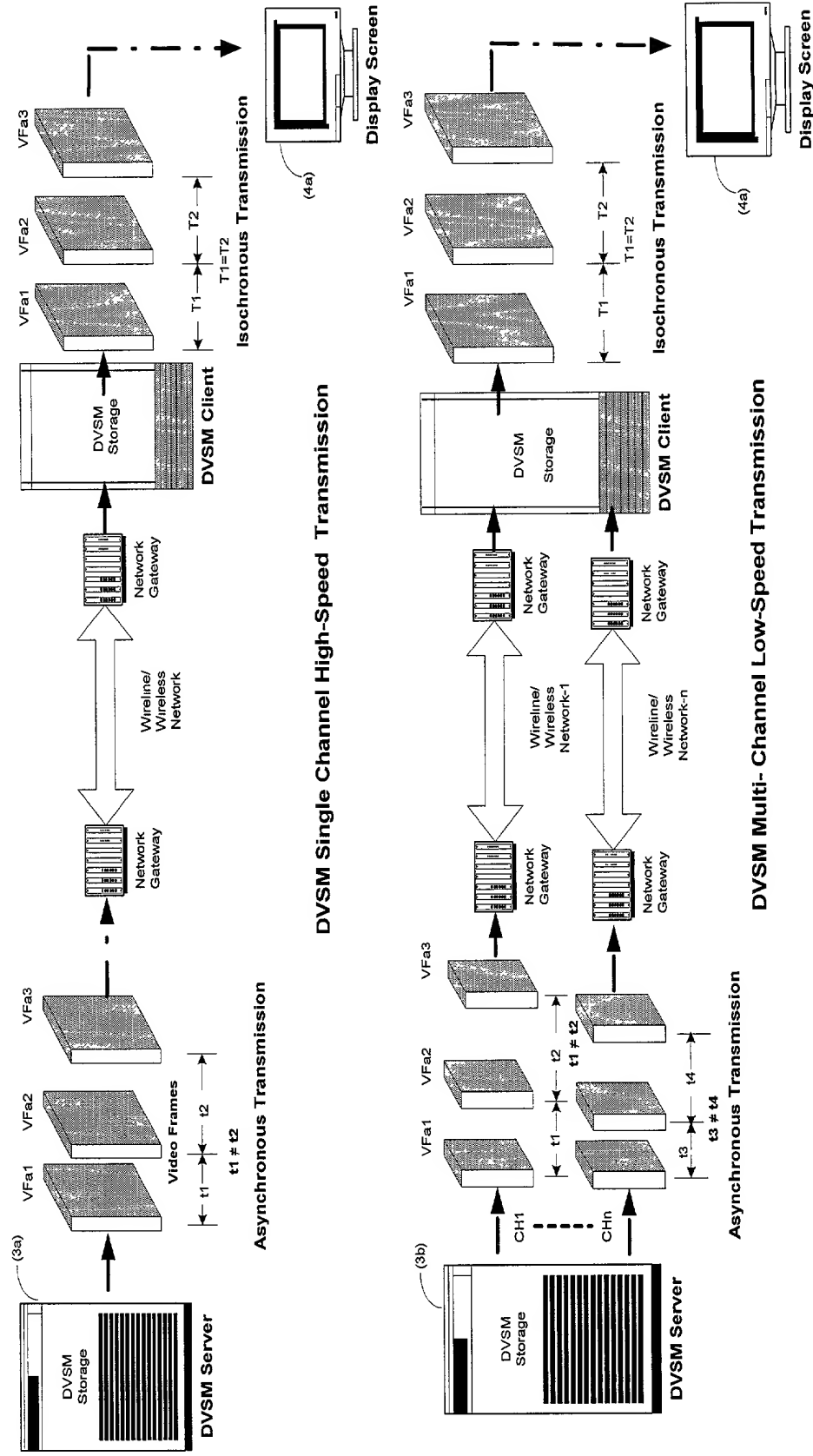


Figure 6(b) - DVSM High Speed & Low Speed Video Transmission

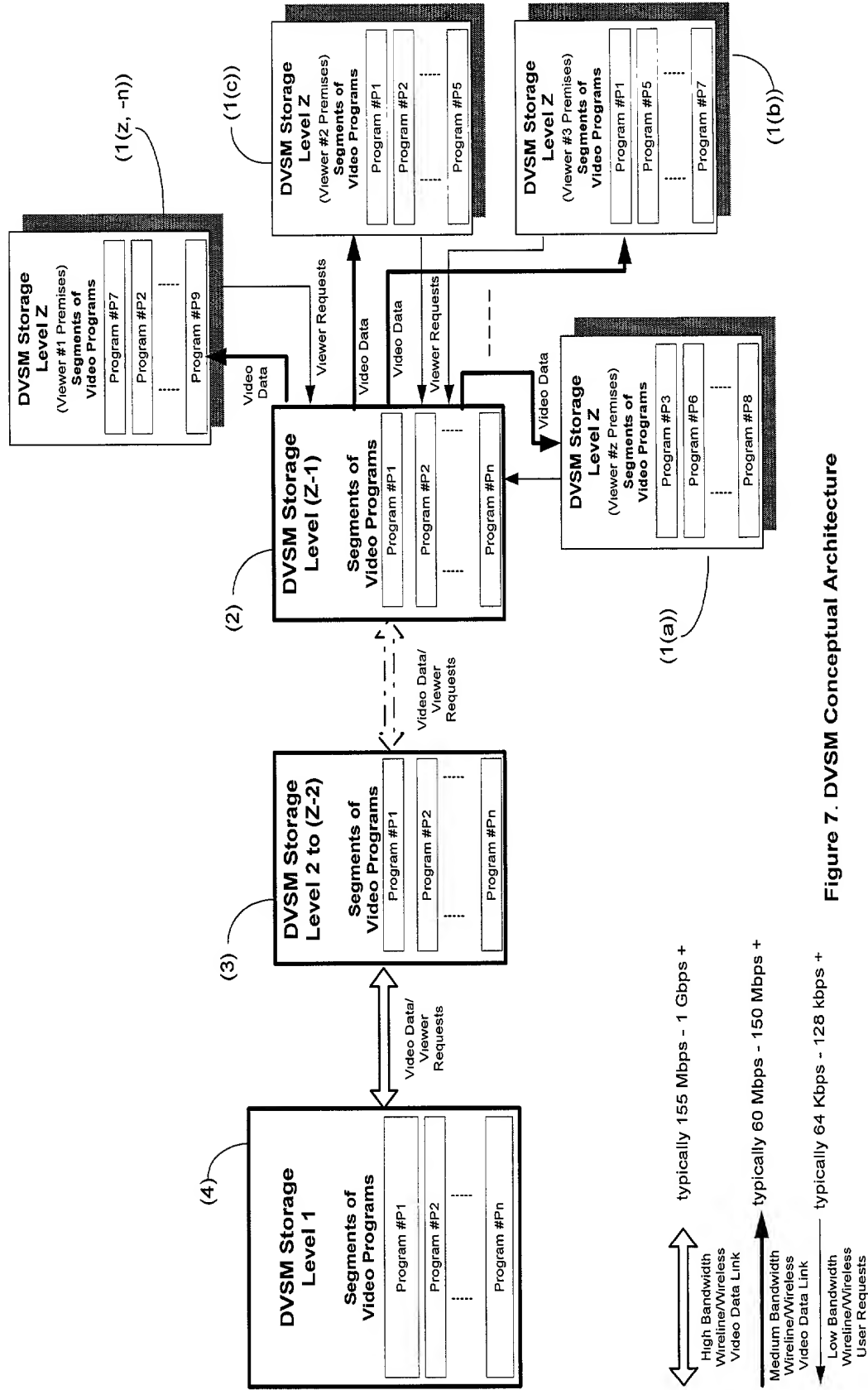


Figure 7. DVSM Conceptual Architecture

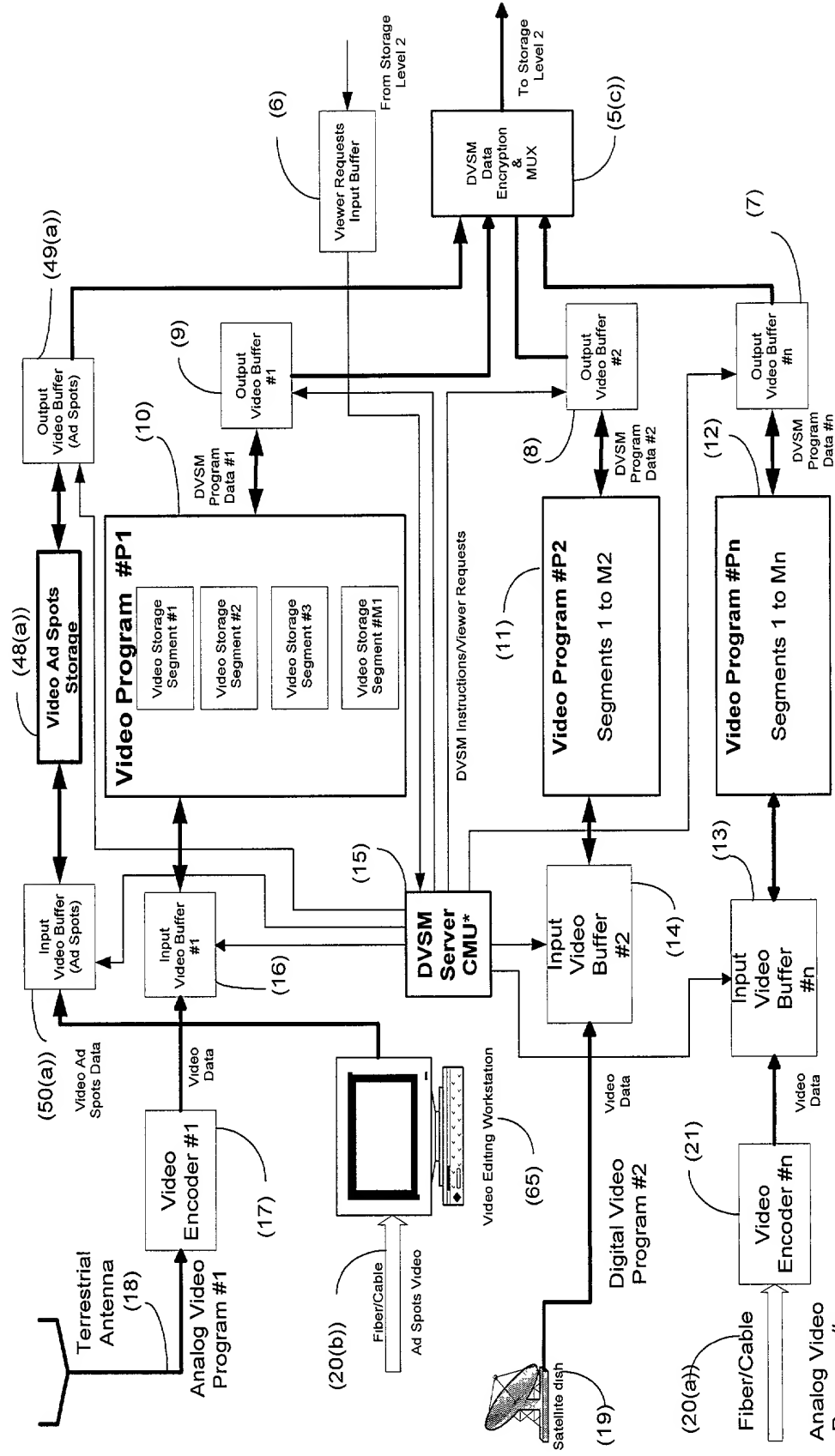


Figure 8. DVSM Data Storage Level 1

*CMU - Control & Management Unit

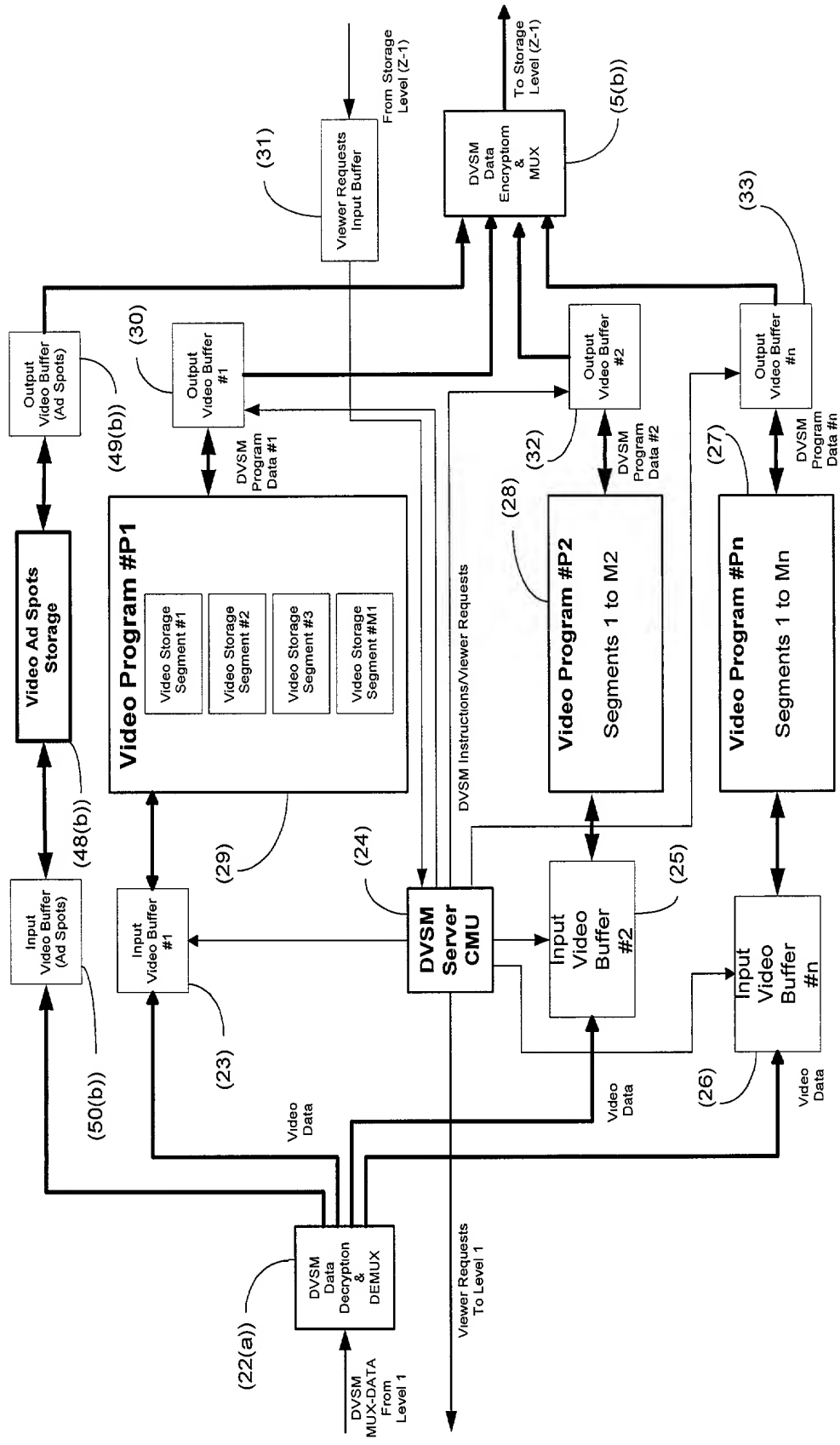


Figure 9. DVSM Data Storage Levels 2 to (Z-2)

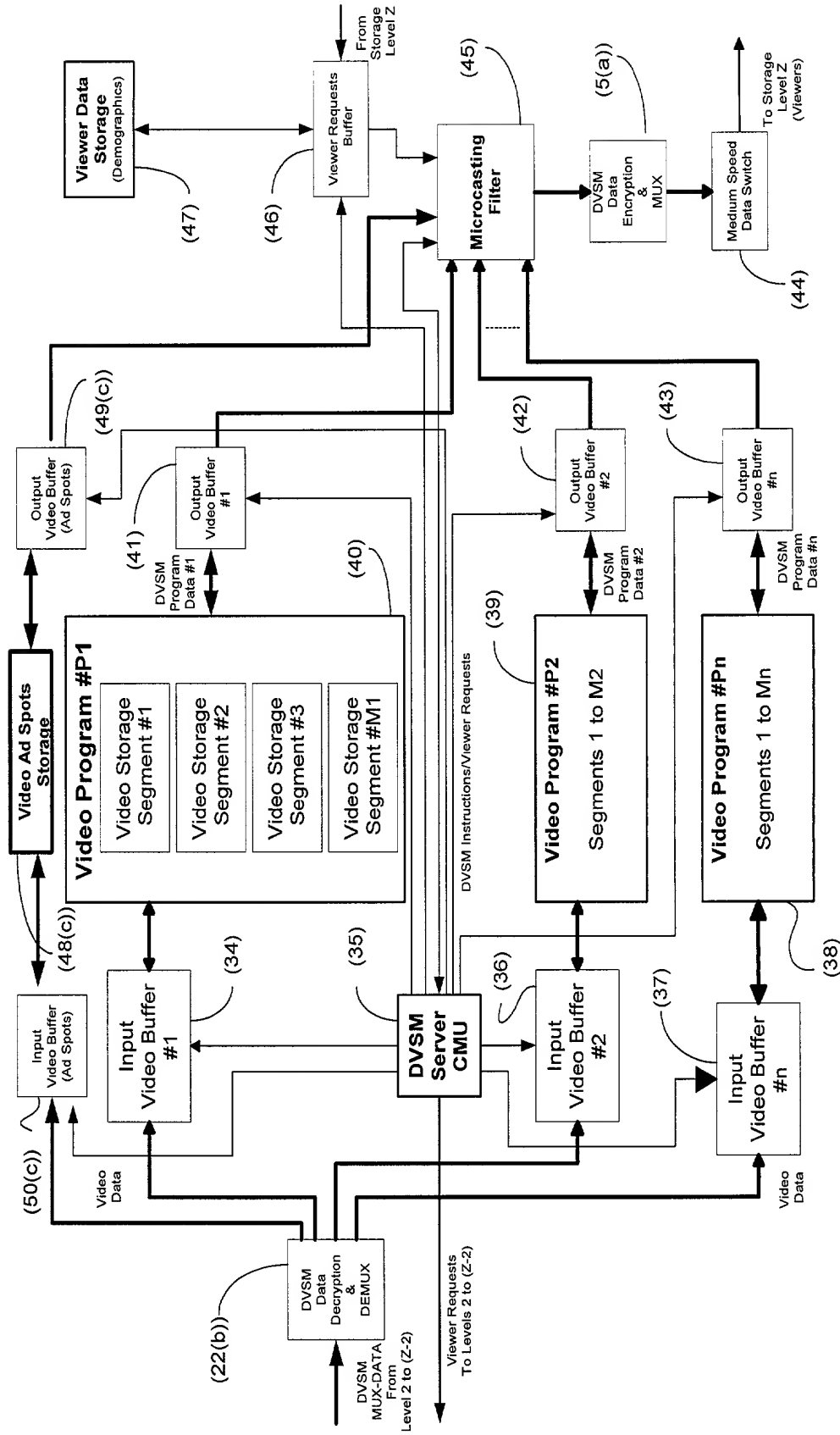


Figure 10. DVSM Data Storage Level (Z-1)

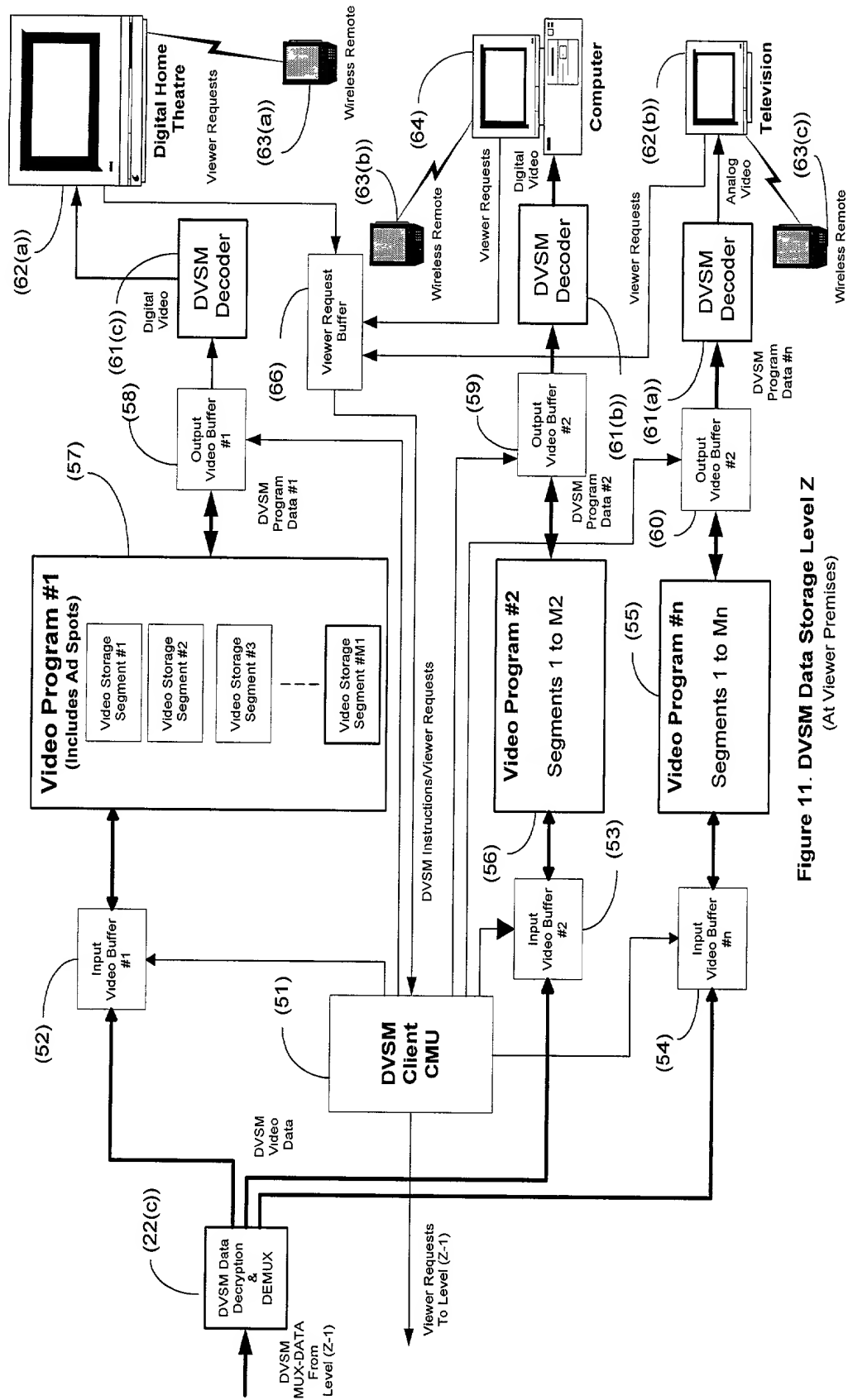


Figure 11. DVSM Data Storage Level Z
(At Viewer Premises)

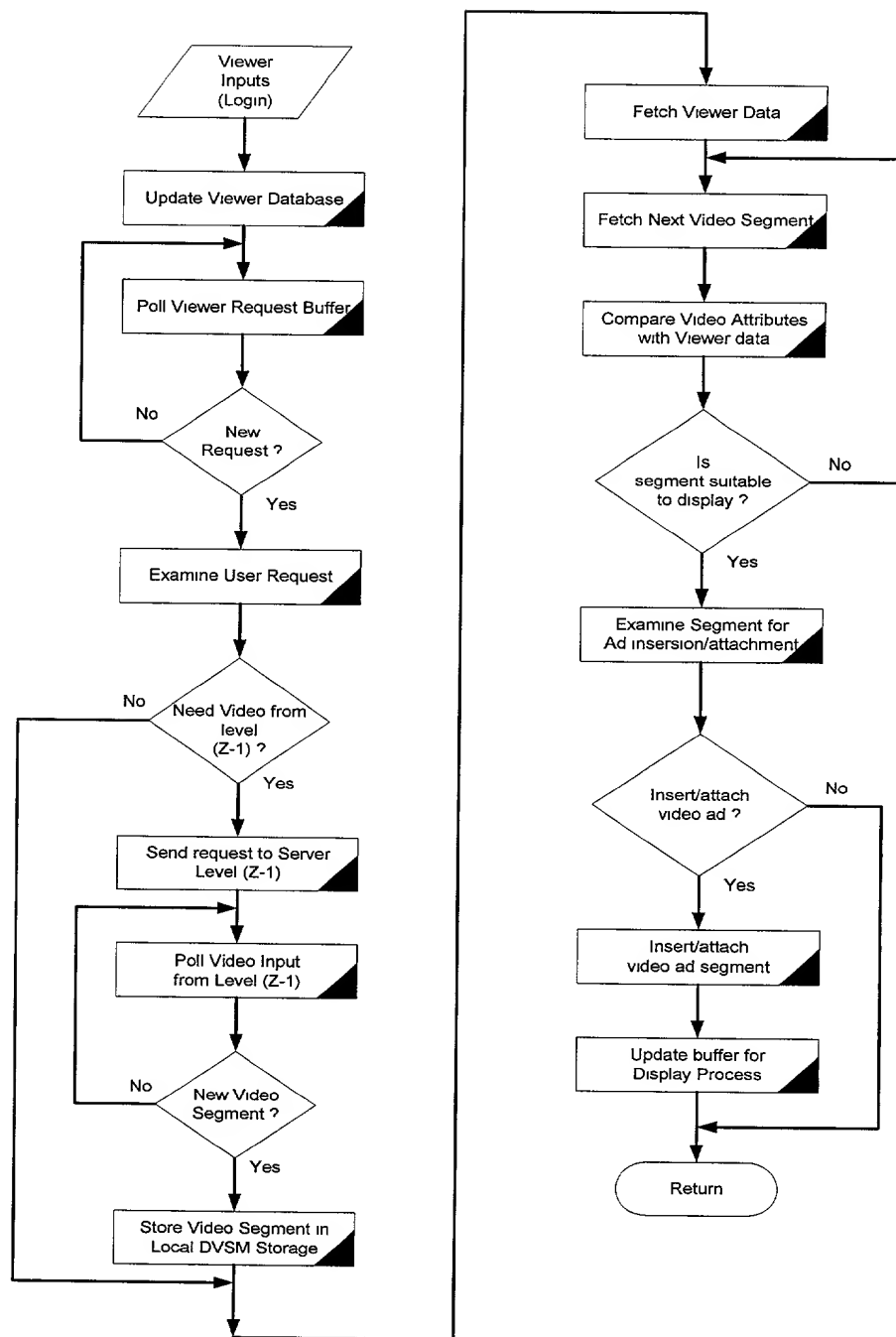


Figure 12 DVSM Microcasting Algorithm

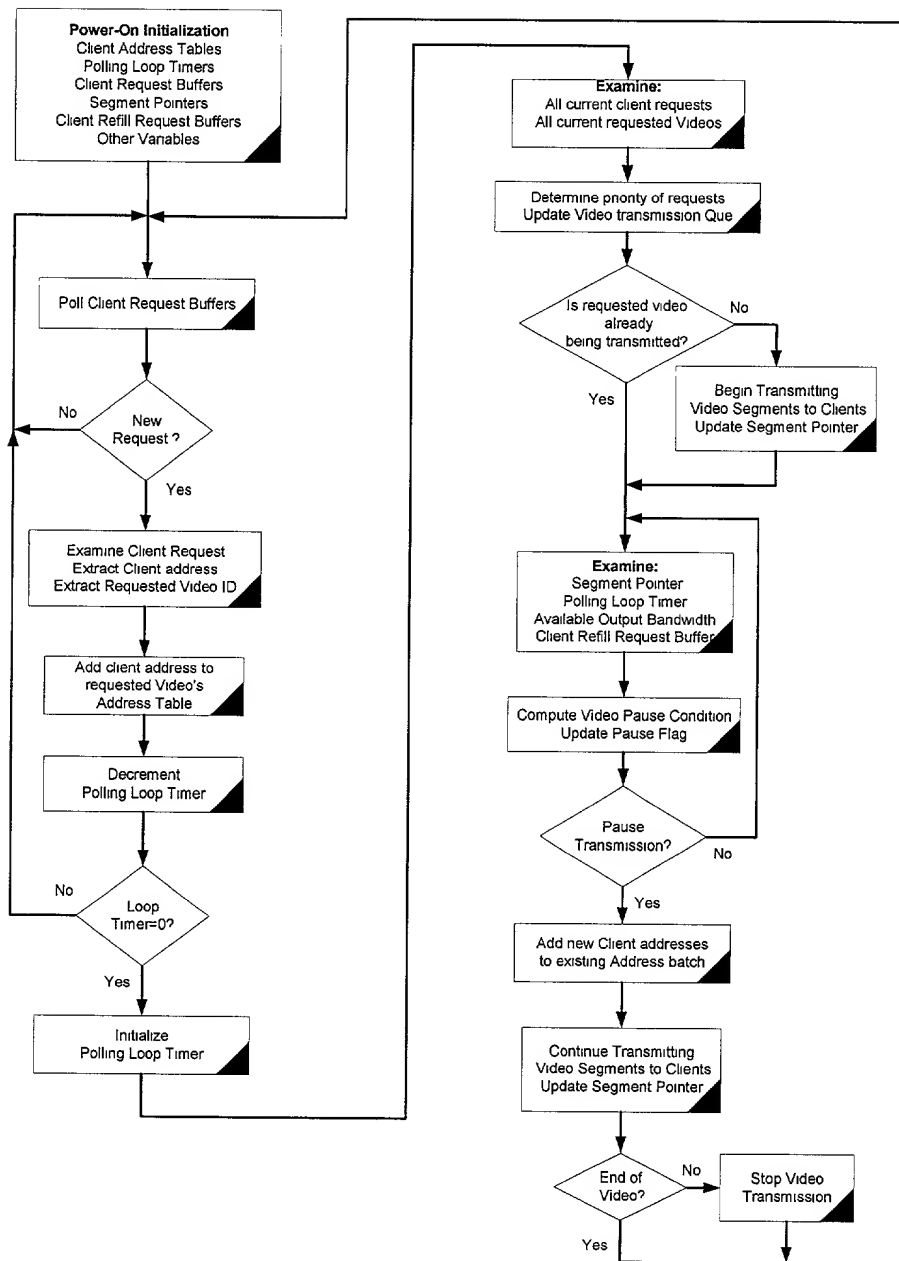


Figure 13 DVSM Multicasting Algorithm

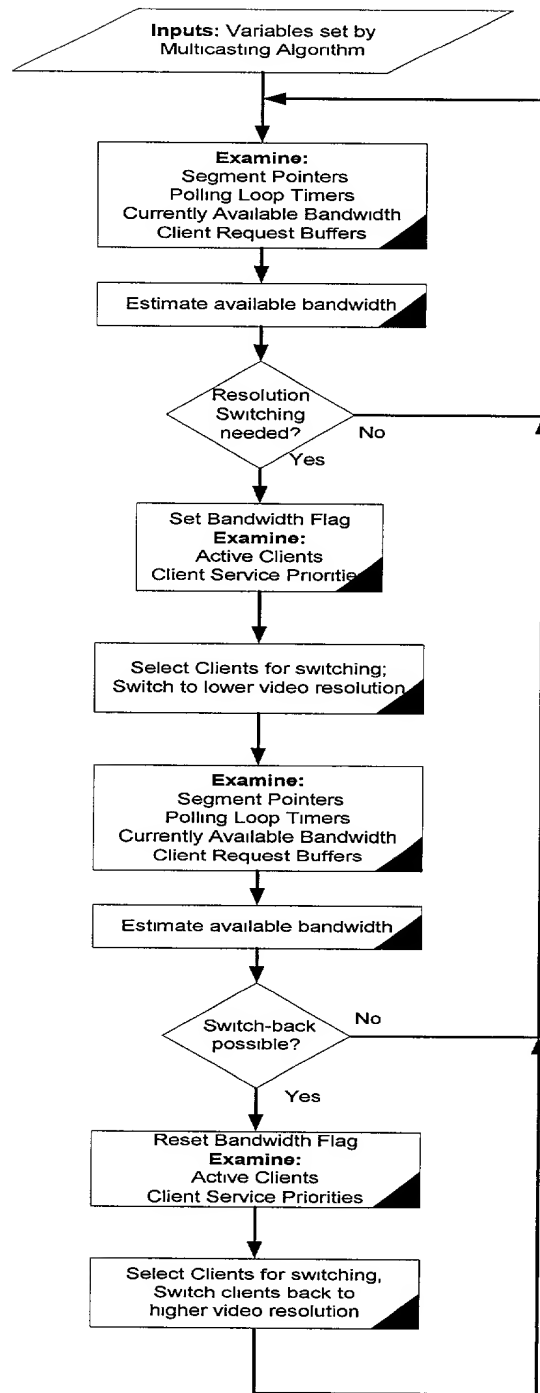


Figure 14 Dynamic Resolution Switching (DRS) Algorithm

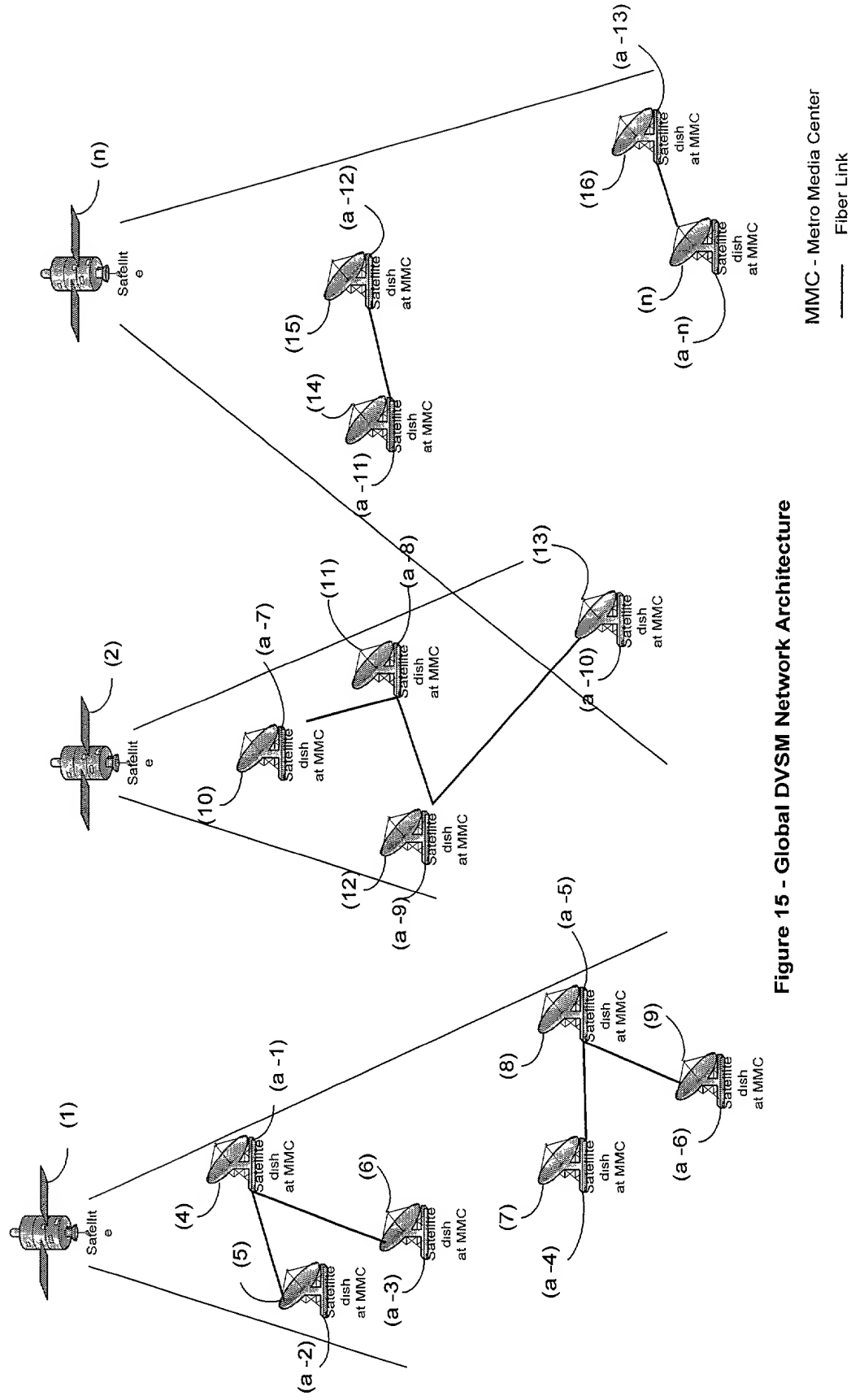


Figure 15 - Global DVSM Network Architecture

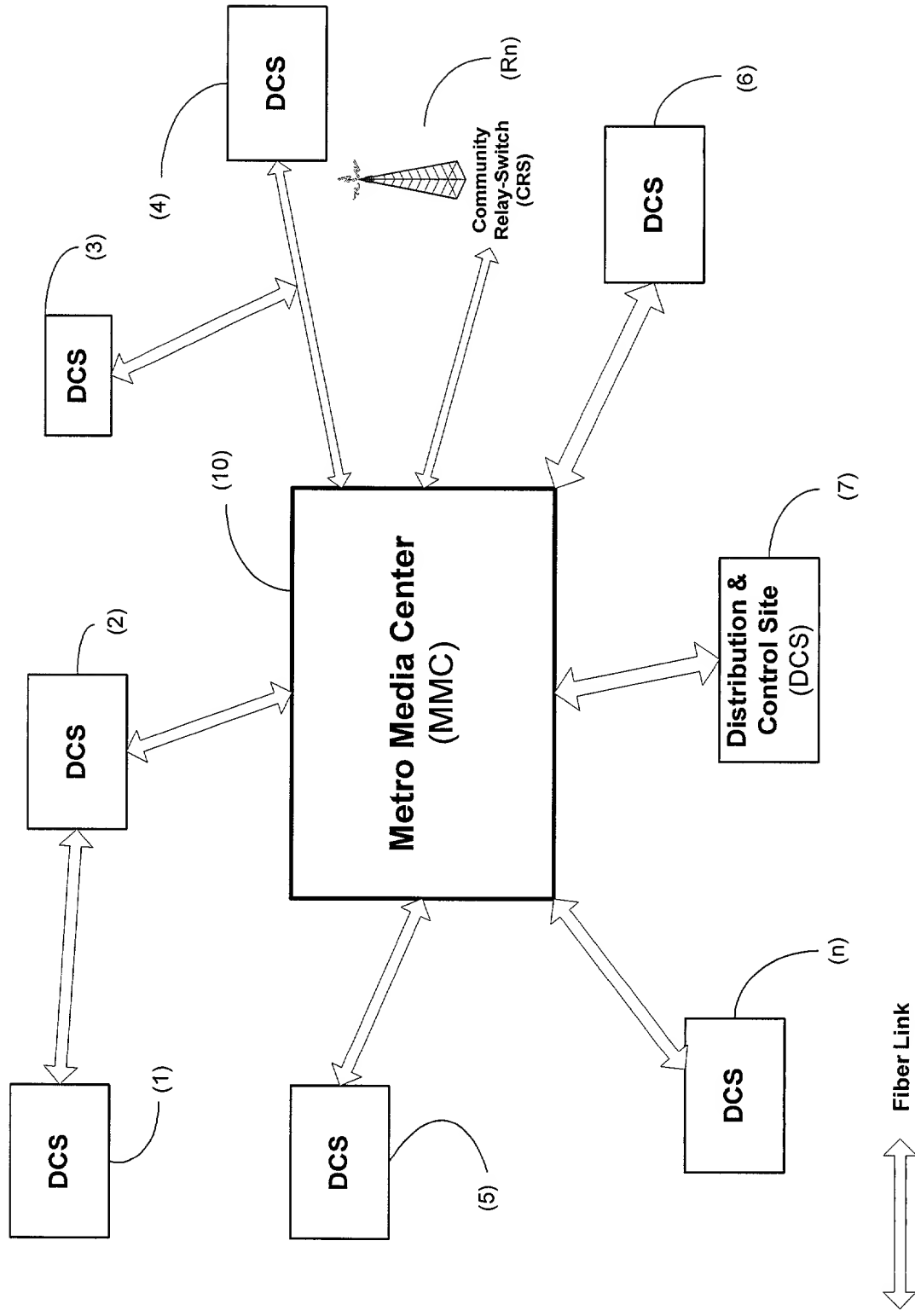


Figure 16 - Metro DVSM Network Architecture

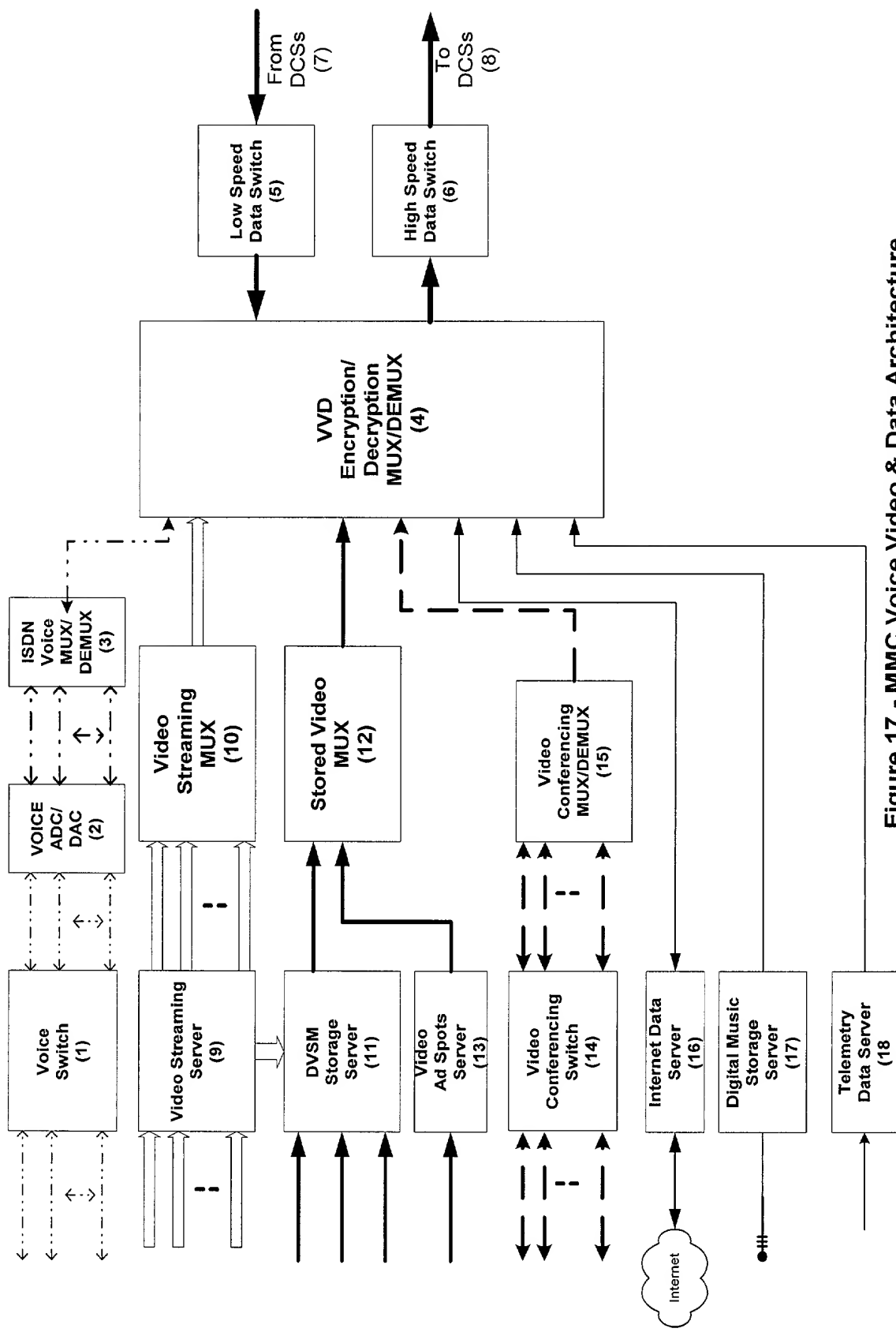


Figure 17 - MMC Voice, Video & Data Architecture

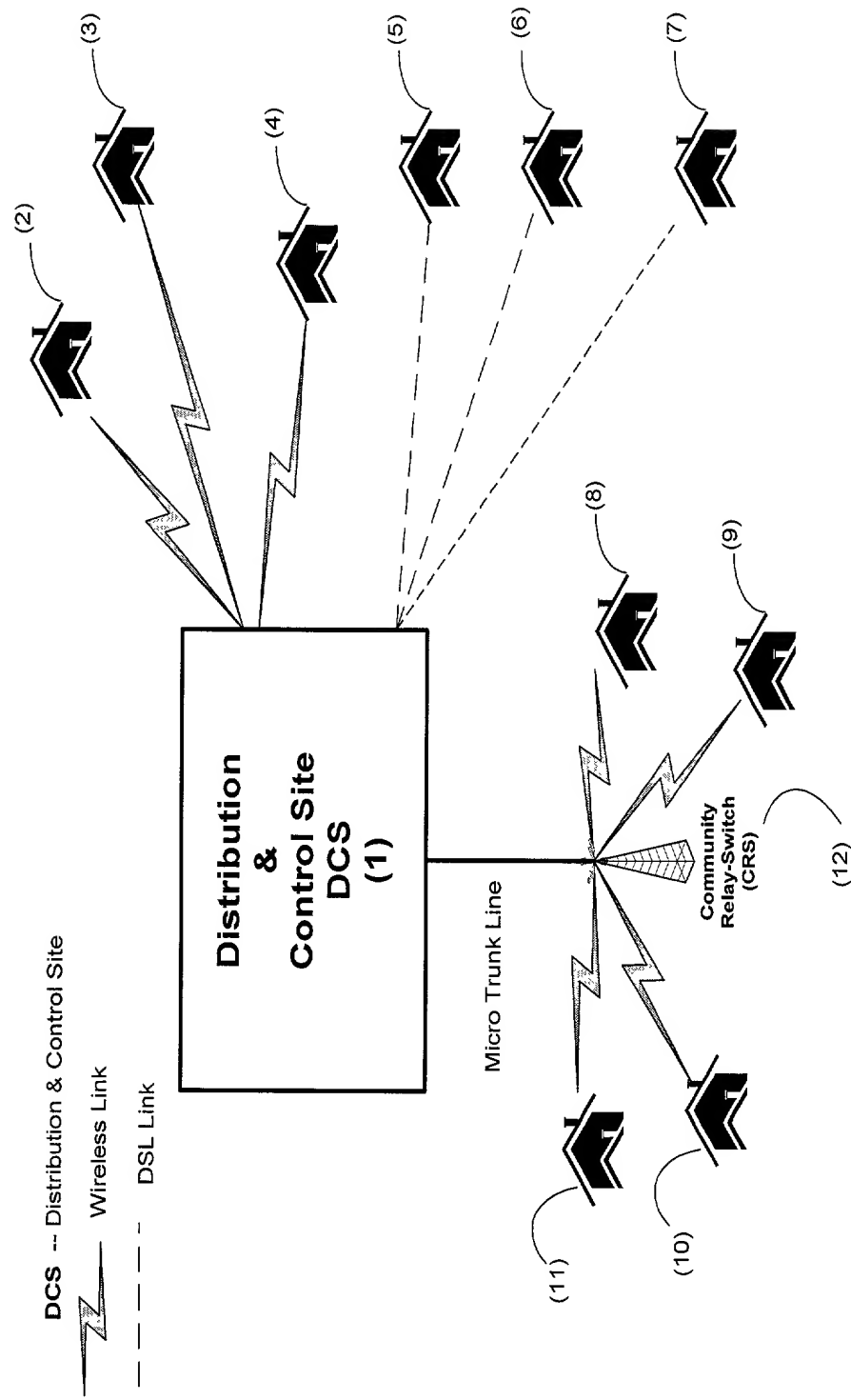


Figure 18 - Community DCS DVSM Architecture

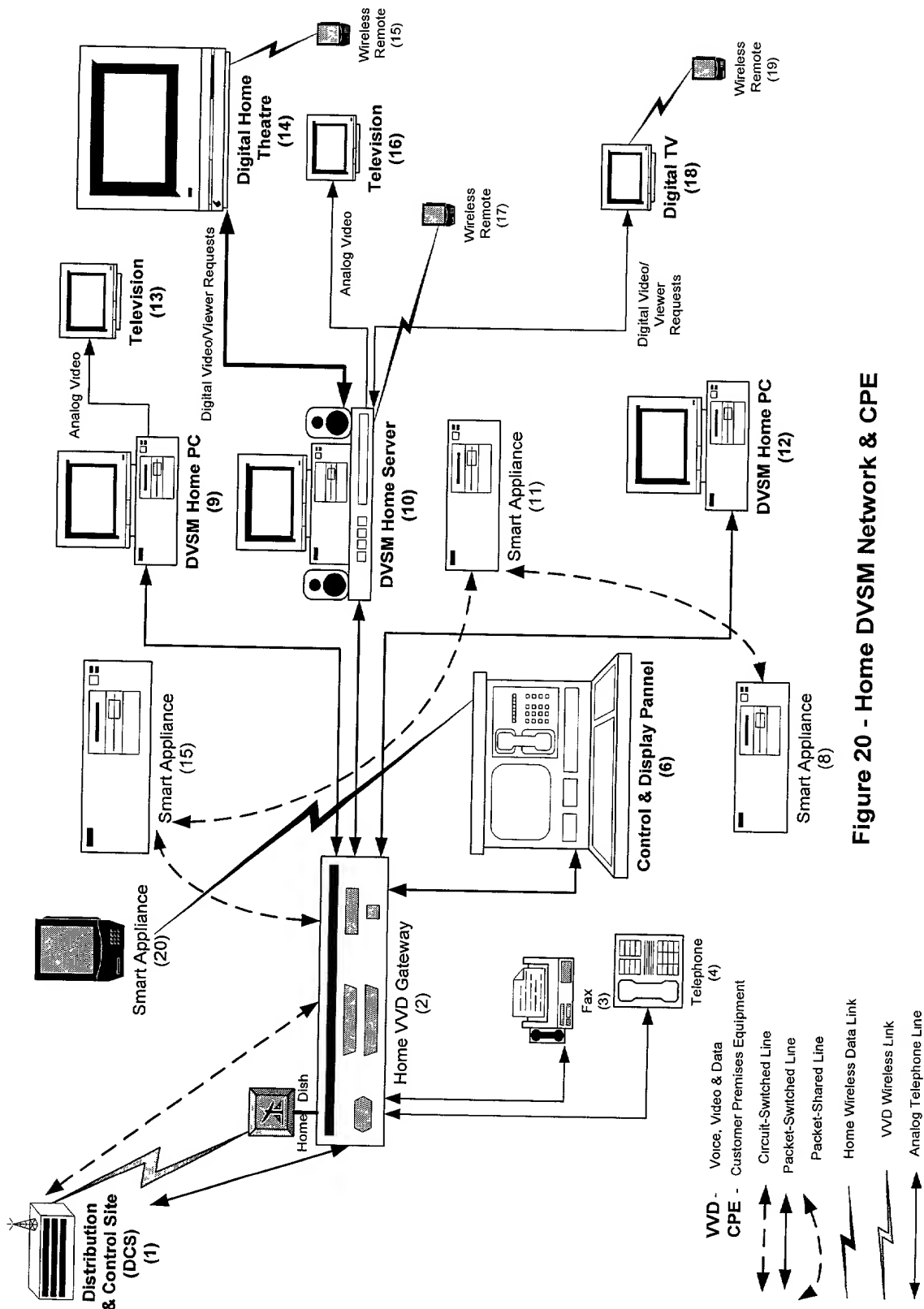


Figure 20 - Home DVSM Network & CPE